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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/652,785

08/29/2003

Gopinath Kuduvalli

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08/05/2009

ACCURAY/BSTZ

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EXAMINER

LAMPRECHT, JOEL

ART UNIT

PAPER NUMBER

3737

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/652,785	Applicant(s) KUDUVALLI ET AL.	
	Examiner JOEL M. LAMPRECHT	Art Unit 3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/30/09</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 8-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grzeszczuk et al (US 6,782,287 B2) in view of Murphy et al (US 6,125,164) and in further view of Bifulco et al (Estimation of OOP vertebra rotations...). Grzeszczuk et al discloses and teaches a method for aligning the position of a target relative to a radiological beam including the acquisition of pre-operative reference images, generation of 2d reconstructed projections of the 3d scan, (Col 3 line 34-Col 4 Line 20) acquiring x-ray images of a target during treatment and registering the reconstructed images with the x-ray images by the use of 3D transformation parameters including

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translations and rotations in three dimensions to adjust the position of within the full six degrees of freedom provided by the transformation parameters (Col 4 Line 7-20, Column 7 Line 1-57). During the process of registration multiple views of the reference reconstructions are registered using 3d transformations with the intraoperative x-ray acquisitions to reconstruct DRRs within a full six-degree of freedom registration onto the projections including three translations and three rotations (Col 8 Line 19-Col 9 Line 40). The estimation of in-plane transformations is not just performed on a surface estimation (Col 2 Line 50-Col 3 Line 10); the radiographs and DRRs are normalized to unit length and intensity thresholded for enhanced out-of-plane estimation, and are refined to an accuracy of ± 0.02 mm and ± 0.05 degrees with a pixel pitch of 1.0 mm, giving sub-pixel accuracy (Col 7 Line 36-Col 8 Line 20, Fig 3, Col 8 Line 2—48). The recitation of means plus function language is acknowledged in claims 23-30, and although the structure disclosed by Grzeszczuk et al is not identical, it is capable of performing the same function as that of the claimed invention.

Grzeszczuk et al discloses all that is listed above, but in the case where 6 DOF registrations are required, the perturbations of DRRs correspond to 6 DOF and additionally, Grzeszczuk et al do not disclose beam pre-and during treatment setups for radiosurgery as the disclosure is focused on tool tracking. Attention is directed to the secondary reference to Murphy et al which discloses a radiographic method for position-orientation along all 6 DOF using an overconstrained set of equations to fit DRRs to X-ray images in real time during treatment. While Murphy et al is capable of perturbations in all 6 DOF, there are also situations disclosed where only two rotations are utilized

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(Fig 10, individual rotations), so as to only require 2 or 5 DOF for calculations. The DRR pre-processing in Murphy et al is performed off-line and the real-time x-ray registration is performed so as to allow for calculation of movement in all 6 DOF (x,y,z,r,p,w), and the correlative method of chi-squared is capable of iteratively reducing the number of perturbations and subsequent transformation parameters required for fitting (Col 5 Line 1 – Col 8 Line 45). The iterative process of Murphy et al allows for sufficiently accurate values (ones that pass the evaluation functions disclosed).

Grzeszczuk et al in view of Murphy et al discloses all that is listed above, but does not specifically disclose how the reduction in variables reduces computational time in terms of the number of degrees of freedom which would be required. Attention is directed to the teaching reference to Bifulco et al, which discloses a method for registering images where lateral bending (axial rotation) occurs and provides a method of registration using a 5 DOF perturbation of DRRs in order to provide a method for registration of a single projection image in real time. Taking the teachings of Bifulco et al into account, it would have been obvious to one of ordinary skill in the art to have utilized this method, in combination with the cross-correlative methods of Murphy et al for multiple camera registration, and the disclosure of Grzeszczuk et al for the purpose of generating accurate representations of patient anatomy during a radiosurgical procedure.

Response to Arguments

Applicant's arguments with respect to claims 8-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL M. LAMPRECHT whose telephone number is (571)272-3250. The examiner can normally be reached on 8:30-5:00 Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571) 272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRIAN CASLER/
Supervisory Patent Examiner, Art
Unit 3737

JML